

REMARKS

This Amendment is submitted in response to the final Office Action mailed on January 18, 2008. No fee is due in connection with this Amendment. The Director is authorized to charge any fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112857-037 on the account statement.

Claims 18-25 are pending in this application. Claims 1-17 were previously canceled without prejudice or disclaimer. In the Office Action, Claims 18 and 24-25 are rejected under 35 U.S.C. §112. Claims 18-25 are rejected under 35 U.S.C. §103. In response, Claims 18 and 24-25 have been amended. These amendments do not add new matter. At least in view of the amendments and/or for the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, Claims 18 and 25 are rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. With respect to Claim 18, the Examiner alleges that the claimed language of “mesophase graphite material” is not supported by the Specification as filed because the Specification only supports a graphite material obtained from a plurality of meso-carbon micro-beads. See, Office Action, page 2, lines 13-16. In response, independent Claim 18 has been amended to recite, in part, a negative electrode comprising a current collector and a powder mixture composed of a graphite material obtained from meso-carbon micro-beads and a binder, wherein the powder mixture is coated on the current collector at a thickness ranging from 10 μm to 200 μm , and wherein the graphite material has a specific surface area that ranges from 0.1 m^2/g to 1.2 m^2/g . The amendment is supported in the Specification at, for example, page 8, lines 16-18; page 9, lines 8-11; page 10, lines 2-6; page 18, lines 8-9. Applicants respectfully submit that there is sufficient support in the Specification for a “graphite material obtained from meso-carbon micro-beads, . . . wherein the graphite material has a specific surface area that ranges from 0.1 m^2/g to 1.2 m^2/g ” as recited by currently amended Claim 18.

With respect to Claim 25, the Examiner asserts that the Specification does not support a non-aqueous solvent in which the content of propylene carbonate is less than 10 mol%. See, Office Action, page 3, lines 2-5. In response, Applicants have amended Claim 25 to recite, in part, a non-aqueous solvent that includes “10 mol% to 35 mol% of propylene carbonate.” This amendment is supported in the Specification at, for example, page 13, lines 14-17. For at least

these reasons, Applicants believe that currently amended Claims 18 and 25 are fully supported by the Specification and, thus, fully comply with 35 U.S.C. §112, first paragraph.

Accordingly, Applicants respectfully request that the rejection of Claims 18 and 25 under 35 U.S.C. §112, first paragraph, be withdrawn.

In the Office Action, Claim 24 is rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Specifically, the Examiner asserts that “the lithium-containing compound” as recited in Claim 24 lacks proper antecedent basis. See, Office Action, page 3, lines 11-12. In response, Applicants have amended Claim 24 to depend from Claim 23. This amendment is supported in the Specification at, for example, page 11, lines 17-21. Because Claim 23 recites, in part, “a lithium-containing compound,” there is sufficient antecedent basis for “the lithium-containing” compound as recited in currently amended Claim 24 that depends therefrom. For at least these reasons, Applicants respectfully submit that currently amended Claim 24 is not vague or indefinite and, therefore, is in compliance with §112, second paragraph.

Accordingly, Applicants respectfully request that the rejection of Claim 24 under 35 U.S.C. §112, second paragraph, be withdrawn.

In the Office Action, Claims 18-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over US 5,772,934 to MacFadden (“*MacFadden*”) in view of US 5,522,127 to Ozaki et al. (“*Ozaki*”). Applicants respectfully submit that one of ordinary skill in the art would have no reason to combine the cited references. Furthermore, even if combinable, the cited references fail to disclose or suggest each and every element of independent Claim 18 and Claims 19-25 that depend therefrom for at least the reasons set forth below.

Currently amended independent Claim 18 recites, in part, a gel electrolyte secondary cell comprising: a positive electrode; a negative electrode comprising a current collector and a powder mixture composed of a graphite material obtained from meso-carbon micro-beads and a binder, wherein the powder mixture is coated on the current collector at a thickness ranging from 10 μm to 200 μm , and wherein the graphite material has a specific surface area that ranges from 0.1 m^2/g to 1.2 m^2/g ; and a gel electrolyte comprising an electrolyte salt, a non-aqueous solvent and a high-molecular weight material having a number average molecular weight ranging from 5000 to 500000, wherein the non-aqueous solvent consists essentially of propylene carbonate and ethylene carbonate, and wherein the gel electrolyte is in contact with the positive electrode and negative electrode and disposed therebetween.

Applicants respectfully submit that one of ordinary skill in the art would have no reason to combine the cited references to arrive at the present claims because the cited references teach away from both each other and the present claims. Of course, references must be considered as a whole and those portions teaching against or away from the claimed invention must be considered. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve Inc.*, 796 F.2d 443 (Fed. Cir. 1986). “A prior art reference may be considered to teach away when a person of ordinary skill, upon reading the reference would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Applicant.” *Monarch Knitting Machinery Corp. v. Fukuhara Industrial Trading Co., Ltd.*, 139 F.3d 1009 (Fed. Cir. 1998), quoting, *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994).

For example, *Ozaki* teaches away from using an electrolyte containing propylene carbonate as taught in *MacFadden* and recited by the present claims. *MacFadden* discloses a solid polymer electrolyte in which the organic solvent is “preferably ethylene carbonate, propylene carbonate, or a mixture of the two, in ratio of 70:30 to 30:70 and most preferably 50:50.” See, *MacFadden*, column 5, lines 11-20. Each example disclosed in *MacFadden* employs an electrolyte in which the organic solvent is a mixture of ethylene carbonate and propylene carbonate. See, *MacFadden*, column 6, lines 54-67; column 7, lines 1-8. Thus, *MacFadden* is directed to an electrolyte that uses propylene carbonate in its solvent.

Like *MacFadden*, the present claims recite, in part, an electrolyte wherein the non-aqueous solvent consists essentially of propylene carbonate and ethylene carbonate. The non-aqueous solvent is a propylene carbonate-ethylene carbonate mixture system in which the propylene carbonate content is between 10 mol% and 35 mol%. See, Specification, page 13, lines 10-17. “[I]f the gel electrolyte is obtained by combining a mixed solvent of propylene carbonate and ethylene carbonate with LiPF_6 , it is possible to achieve ion conductivity not less than 1 mS/cm at a temperature of 25°C or lower to impart high capacity to the cell.” See, Specification, page 15, lines 5-8.

In contrast, *Ozaki* teaches away from using propylene carbonate in the electrolyte. The Examiner alleges that *Ozaki* discloses the use of a non-aqueous electrolyte secondary cell having a negative electrode comprising graphite particles with a specific surface area between 1.0 and 8.0 m^2/g , preferably 2.5 to 5.0 m^2/g . See, Office Action, page 4, lines 15-21. Nevertheless, *Ozaki* teaches that “[a]s for the organic solvent of the organic electrolyte for the non-aqueous electrolyte, propylene carbonate (PC) is not employed, because it decomposes to generate a gas

[at] during discharging." See, *Ozaki*, column 7, lines 5-8. Thus, *Ozaki* teaches that its graphite material is not suitable for use with propylene carbonate and one of ordinary skill in the art would have no reason to combine *Ozaki* with *MacFadden* to arrive at the present claims.

Even if combinable, the cited references also fail to disclose or suggest every element of the presently pending claims. If a non-aqueous secondary cell contains an electrolyte employing propylene carbonate as a main solvent and a negative electrode containing graphite type carbonaceous material, the propylene carbonate is decomposed because it is unstable against graphite type carbonaceous material. See, Specification, page 5, lines 6-11. The decomposition of the propylene carbonate causes a discharge capacity loss, thereby lowering the charging/discharging efficiency of the cell. See, Specification, page 5, lines 10-11. However, the degree of decomposition of propylene carbonate varies depending on the physical properties of the graphite carbonaceous material. See, Specification, page 5, lines 16-20. If the specific surface area of the graphite material is too large, the decomposition of propylene carbonate is large. See, Specification, page 9, lines 20-21; page 10, lines 1-2. Yet if the specific surface area is too small, the discharge capacity is lowered. See, Specification, page 10, lines 2-6. In light of these limitations, the present claims are directed to a gel electrolyte secondary cell wherein the graphite material has a specific surface area that ranges from 0.1 m²/g to 1.2 m²/g. Within the claimed range, the specific surface area of the graphite material is small enough that the gel electrolyte may contain propylene carbonate without lowering the charging/discharging efficiency yet large enough that the discharge capacity of the cell is high. See, Specification, page 9, lines 20-21; page 10, lines 1-2. In contrast, the cited references fail to disclose or suggest every element of the presently pending claims.

For example, the cited references fail to disclose or suggest a gel electrolyte secondary cell wherein the graphite material has a specific surface area that ranges from 0.1 m²/g to 1.2 m²/g. Because the Examiner admits that *MacFadden* does not disclose "a graphite material obtained from a plurality of meso-carbon micro-bead[s] having a specific surface area that ranges from 0.1-1.2 m²/g," the Examiner relies on *Ozaki* as support for this limitation. See, Office Action, page 4, lines 13-21. However, *Ozaki* merely discloses that a favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m²/g, preferably 2.5 to 5.0 m²/g. See, *Ozaki*, column 6, lines 50-58. Nowhere does *Ozaki* disclose or suggest using a specific surface area smaller than 1.0 m²/g, and none of the examples disclosed in *Ozaki* demonstrate a specific surface area less than 3.0 m²/g. See, *Ozaki*, column 3, lines 33-64.

Furthermore, *Ozaki* specifically states that its graphite material is not used with propylene carbonate because the propylene carbonate decomposes. See, *Ozaki*, column 7, lines 5-8.\

Although a claimed range may overlap with a broad prior art range, the range is novel if a composition within that range exhibits an “unexpected advantageous property” over the prior art range. *In re Russell*, 439 F.2d 1228 (C.C.P.A. 1971). In the claimed range of 0.1 to 1.2 m²/g, propylene carbonate may be employed as the organic solvent in the electrolyte without decomposing to a significant degree and thereby lowering the charging/discharging efficiency. See, Specification, page 9, lines 20-21; page 10, lines 1-2. Thus, the claimed range provides the “unexpected advantageous property” of the graphite material not decomposing the propylene carbonate to a significant degree such that the gel electrolyte may contain propylene carbonate and still have a high charging/discharging efficiency. Therefore, Applicants respectfully submit that the claimed specific surface area range is novel, and the cited references fail to disclose or suggest a gel electrolyte secondary cell wherein the graphite material has a specific surface area that ranges from 0.1 m²/g to 1.2 m²/g as required, in part, by the present claims.

Accordingly, Applicants respectfully request that the rejection of Claims 18-25 under 35 U.S.C. §103(a) to *MacFadden* in view of *Ozaki* be withdrawn.

In the Office Action, Claims 18-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over EP 0,724,305 A1 to Akashi (“*Akashi*”) in view of *Ozaki*. Applicants respectfully submit that one of ordinary skill in the art would have no reason to combine the cited references. Furthermore, even if combinable, the cited references fail to disclose or suggest each and every element of independent Claim 18 and Claims 19-25 that depend therefrom for at least the reasons set forth below.

Applicants respectfully submit that one of ordinary skill in the art would have no reason to combine the cited references to arrive at the present claims because the cited references teach away from both each other and the present claims. As discussed previously, *Ozaki* teaches away from the present claims because it states that its graphite material is not used with propylene carbonate due to decomposition. For the same reasons, *Ozaki* also teaches away from the gel electrolyte of *Akashi*. In contrast to *Ozaki*, *Akashi* expressly states that “[a] particularly preferable example of the non-aqueous solvent for the gel electrolyte is a mixture containing ethylene carbonate (EC) and propylene carbonate (PC) in combination.” See, *Akashi*, page 3, lines 7-9. Thus, Applicants respectfully submit that one of ordinary skill in the art would have

no reason to combine the graphite material of *Ozaki* with the electrolyte of *Akashi* to arrive at the present claims.

Even if combinable, the cited references fail to disclose or suggest a gel electrolyte secondary cell wherein the graphite material has a specific surface area that ranges from $0.1 \text{ m}^2/\text{g}$ to $1.2 \text{ m}^2/\text{g}$. Because the Examiner admits that *Akashi* does not teach the negative electrode comprising a graphite material obtained from a plurality of meso-carbon micro-bead[s] having a specific surface area that ranges from $0.1\text{-}1.2 \text{ m}^2/\text{g}$, the Examiner relies on *Ozaki* as support for this limitation. See, Office Action, page 6, line 16; page 7, lines 1-7. However, for reasons discussed previously, the claimed range of specific surface area of the graphite material provides an unexpected advantageous property over *Ozaki* and is, therefore, novel. Thus, Applicants respectfully submit that the cited references fail to disclose a gel electrolyte secondary cell wherein the graphite material has a specific surface area that ranges from $0.1 \text{ m}^2/\text{g}$ to $1.2 \text{ m}^2/\text{g}$ as required, in part, by the present claims.

Accordingly, Applicants respectfully request that the rejection of Claims 18-25 under 35 U.S.C. §103(a) to *Akashi* in view of *Ozaki* be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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